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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/038,512	10/19/2001	Soren A. Rasmussen	2954/1J910-US1	5999

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DARBY & DARBY P.C.
P. O. BOX 5257
NEW YORK, NY 10150-5257

EXAMINER	
BARAN, MARY C	

ART UNIT	PAPER NUMBER
2857	

DATE MAILED: 03/23/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

EK

Office Action Summary	Application No.	Applicant(s)	
	10/038,512	RASMUSSEN ET AL.	
	Examiner	Art Unit	
	Mary Kate B. Baran	2857	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *05 January 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-34* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-34* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *05 January 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☒ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. The action is responsive to the Amendment filed on 05 January 2005. Claims 1-34 are pending. Claims 1, 6, 11, 17, 21 and 31-33 have been amended. Claims 35-40 have been cancelled.

2. The amendments filed 05 January 2005 are sufficient to overcome the prior objections to the specification, abstract, claims and drawings as well as the prior 35 U.S.C. 112 first and second paragraph rejections.

Priority

3. Acknowledgment is made of applicant's claim for foreign priority based on an application filed in Denmark on 9 August 2001. It is noted, however, that applicant has not filed a certified copy of the foreign application as required by 35 U.S.C. 119(b).

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claim 24 is rejected under 35 U.S.C. 102(e) as being anticipated by Quist et al. (U.S. Patent No. 6,199,018) (hereinafter Quist).

Referring to claim 24, Quist teaches a system for automatically outputting a fault diagnosis (see Quist, column 3 lines 27-35), including: a signal processing unit for measuring data and recording the measured data in a database (see Quist, column 12 lines 24-29); and a server for testing, for a plurality of fault conditions corresponding to one or more components, whether the measured data stored in the database indicates those faults (see Quist, column 22 line 57 – column 23 line 5), and outputting a text message identifying any faults detected and the likely time before the fault becomes critical (see Quist, column 5 lines 4-18).

5. Claims 23, 25-29, and 31-34 are rejected under 35 U.S.C. 102(e) as being anticipated by Schneider et al. (U.S. Patent No. 6,718,533).

Referring to claim 23, Schneider teaches a system for automatically outputting a fault diagnosis for at least one possible fault, including a hierarchical database including a number of general object classes corresponding to different types of machine component and the machine component program objects are specific instances of the general object class corresponding most closely to the machine component (see Schneider, column 11 lines 7-11), which specific instances inherit code relating to possible faults in the type of machine component from the general object class, the machine component program object including code for determining whether specific faults occur (see Schneider, column 13 lines 36-44).

Referring to claim 25, Schneider teaches an automatic machinery fault diagnostic method and procedure for machines or one or more components thereof, characterized by using a machinery fault class library including references to specific signatures calculated from signals acquired from sensors placed at specific locations on said machine (see Schneider, column 25 lines 21-40).

Referring to claim 26, Schneider teaches references to specific signatures for each fault class (see Schneider, column 13 lines 38-44).

Referring to claim 27, Schneider teaches using a combination of unique fault signatures measured at specific machine states (see Schneider, column 13 lines 38-44).

Referring to claim 28, Schneider teaches determining the machine states by virtual measurements in a signal processing unit or acquired from external systems (see Schneider, column 13 lines 20-35).

Referring to claim 29, Schneider teaches determining the machine states by virtual measurements in a signal processing unit by using a predetermined monitoring strategy as to when and how often to collect data (see Schneider, column 12 lines 23-36).

Referring to claim 31, Schneider teaches using a fault class method in terms of a formal diagnostic language comprising mathematical operations or logic (see Schneider, column 12 lines 15-21).

Referring to claims 32 and 33, Schneider teaches instantiating a diagnostic fault method object per signature, per component, per machine, adapted by entering machine specific information (see Schneider, column 11 lines 8-15).

Referring to claim 34, Schneider teaches a diagnostic class method being editable in terms of modifications and expansions; modifications being instantaneously applied to associated object methods.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-11, 14-22 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Quist et al. (U.S. Patent No. 6,199,018) (hereinafter Quist) in view of Beakley (U.S. Patent No. 6,597,957).

Referring to claims 1, 11 and 21 Quist teaches a method of automatic fault diagnosis including: for each of a plurality of components of machines, carrying out the steps of: for at least one possible fault in the component (see Quist, column 3 lines 27-35); calculating a total fault symptom value from measured data indicating the fault (see Quist, column 23 lines 21-35); and determining whether the total fault symptom value lies above a first predetermined value for that fault, recalling stored data relating to the total fault system value as a function of time (see Quist, column 22 line 57 – column 23 line 5), fitting the stored data relating to a trend line (see Quist, column 24 lines 14-18) and predicting the time when the total fault symptom value will exceed a second predetermined value (see Quist, column 23 lines 54-58), selecting a message based on the total fault symptom value and the predicted time, and outputting the selected message (see Quist, column 5 lines 4-18), but does not teach a total fault symptom strength value.

Beakley teaches a total fault symptom strength value (see Beakley, column 4 lines 41-49).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify Quist to include the teachings of Beakley because determining a total fault symptom strength value would have allowed the skilled artisan to locate critical events and find patterns in the events (see Beakley, column 4 lines 46-49).

Referring to claims 2 and 14, Quist teaches that the reduced dataset is stored in a database and the method further includes automatically taking measurements of the

component when a predetermined condition occurs (see Quist, column 5 line 51 – column 6 line 6), calculating new reduced data, testing whether the new measurements represent a significant change on the reduced data stored in the signature database, and storing the new reduced data in the database if the step of testing indicates a significant change (see Quist, column 12 lines 24-39).

Referring to claims 3 and 15, Quist teaches that the method further includes classifying the operation state of the data, comparing the new reduced data with reduced data from the same operation state and storing the new reduced data in the database indexed by the operation state (see Quist, column 6 lines 7-20).

Referring to claims 4, 16 and 22, Quist teaches a method of automatic fault diagnosis for machinery having a plurality of components, based on a reduced dataset calculated from data measured on the machinery (see Quist, column 3 lines 27-35), the method comprising: for at least one machine component, and for at least one fault that may occur in that component (see Quist, column 3 lines 27-35), carrying out the steps of: calculating for each of a plurality of symptoms for indicating that fault, a symptom value as a function of the reduced dataset calculated from measured data (see Quist, column 23 lines 21-35); combining the symptom values to give a total fault symptom value; and carrying out fault processing if the total fault symptom lies above a predetermined value (see Quist, column 24 lines 35-39), but does not teach a total fault symptom strength value.

Beakley teaches a total fault symptom strength value (see Beakley, column 4 lines 41-49).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify Quist to include the teachings of Beakley because determining a total fault symptom strength value would have allowed the skilled artisan to locate critical events and find patterns in the events (see Beakley, column 4 lines 46-49).

Referring to claim 5, Quist teaches classifying the operation state of the machine and recording the classification of operation state together with the measured data in the reduced dataset and calculating the symptom values from data from selected classification states (see Quist, column 23 lines 6-35).

Referring to claim 6, Quist teaches that in addition to a symptom value representing the relative magnitude of deviation of measured values in an operation state from a baseline values in an operation state a symptom strength representing the size of the measured values is calculated for each of the symptoms (see Quist, column 22 lines 40-49).

Referring to claim 7, Quist teaches that the total symptom strength of a fault is calculated from a fuzzy minimum of symptom values corresponding to the fault (see Quist, column 3 lines 36-47).

Referring to claims 8 and 18, Quist teaches that if the total fault symptom strength for the fault lies below a first predetermined threshold, carrying out no further processing for that fault (see Quist, column 5 lines 4-18), and if the total fault symptom strength lies above the first predetermined value switching, for the fault, from a first mode in which the value of the total fault symptom strength is not recorded on an ongoing basis to a second mode in which the total fault symptom strength is recorded on an ongoing time series basis (see Quist, column 23 lines 21-29).

Referring to claims 9 and 19, Quist teaches automatically starting a routine for checking the faults of a component at regular intervals, the routine calculating the total fault symptom values, and if necessary carrying out fault processing for each of a plurality of faults that may occur in that component (see Quist, column 4 lines 5-8).

Referring to claims 10 and 20, Quist teaches that the reduced dataset is stored in a database and the method further includes automatically taking measurements of the component when a predetermined condition occurs (see Quist, column 5 line 51 – column 6 line 6), calculating new reduced data, testing whether the new measurements represent a significant change on the reduced data stored in the signature database, and storing the new reduced data in the database if the step of testing indicates a significant change (see Quist, column 12 lines 24-39).

Referring to claim 17, Quist teaches code for classifying the operation state of the machine and recording the classification of operation state together with the measured data in the reduced dataset (see Quist, column 23 lines 21-27).

7. Claims 12 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Quist et al. (U.S. Patent No. 6,199,018) (hereinafter Quist) in view of Beakley (U.S. Patent No. 6,597,957) and in further view of Schneider et al. (U.S. Patent No. 6,718,533) (hereinafter Schneider).

Referring to claim 12, Quist and Beakley teach all the features of the claimed invention except that a machine component object is provided for each of the machine components for which autodiagnosis is performed.

Schneider teaches that a machine component object is provided for each of the machine components for which autodiagnosis is performed (see Schneider, column 11 lines 7-11).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify Quist and Beakley to include the teachings of Schneider because associating a machine component with an object-oriented class would have allowed the skilled artisan to model the system (see Schneider, column 4 lines 37-49).

Referring to claim 13, Quist and Beakley teach all the features of the claimed invention except that the program includes a number of general object classes corresponding to different types of machine component and the machine component

objects are specific instances of the general object class corresponding most closely to the machine component, which specific instances inherit code relating to possible faults in the type of machine component from the general object class.

Schneider teaches that the program includes a number of general object classes corresponding to different types of machine component and the machine component objects are specific instances of the general object class corresponding most closely to the machine component (see Schneider, column 11 lines 7-11), which specific instances inherit code relating to possible faults in the type of machine component from the general object class (see Schneider, column 13 lines 36-44).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify Quist and Beakley to include the teachings of Schneider because using objects associated with components and faults would have allowed the skilled artisan to model the system (see Schneider, column 4 lines 37-49).

8. Claim 30 is rejected under 35 U.S.C. 103(a) as being unpatentable over Schneider et al. (U.S. Patent No. 6,718,533) (hereinafter Schneider) in view of Quist et al. (U.S. Patent No. 6,199,018) (hereinafter Quist).

Referring to claim 30, Schneider teaches all the features of the claimed invention but does not teach using an event controlled data communication strategy from said signal processing unit for communication with a server, only data including new information being communicated to said server.

Quist teaches using an event controlled data communication strategy from said signal processing unit for communication with a server, only data including new information being communicated to said server (see Quist, column 5 line 51 – column 6 line 6).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify Schneider to include the teachings of Quist because sending new data to the server would have allowed the skilled artisan to generate updated comparison data for use in determining and predicting the operation and failure of the machines (see Quist, column 5 line 62 – column 6 line 6).

Response to Arguments

9. Applicant's arguments with respect to claims 1-22 have been considered but are moot in view of the new ground(s) of rejection.

Applicant argues that Quist does not teach a first and second predetermined threshold value. However, Applicant's arguments are not well taken. Quist teaches determining if data exceeds a statistical data value, or a quality range by a certain amount (see Quist, column 22 line 63 – column 23 line 5). This value is then set as a "birth certificate" value, or a baseline specific to the motor under test, and used as a second threshold when the motor is tested again in a "learning mode" (see Quist, column 24 lines 8-39). During testing under the "learning mode" the future life of the machine is predicted (see Quist, column 23 lines 54-67).

Applicant further argues that when the second predetermined threshold value is exceeded, stored data for that value is recalled, fitted to a trend line and tested for the predicted time; however, Applicant's arguments are not well taken. The claim recites determining when a first threshold value is exceeded (see Quist, column 22 line 63 – column 23 line 5), recalling stored data relating to the total fault system value as a function of time (see Quist, column 25 lines 44-59), fitting the stored data to a trend line (see Quist, column 24 lines 14-18) and predicting the time when a total fault value will be exceeded (see Quist, column 23 lines 54-67). It is not clear from the claimed language which of these steps would be performed when one or both of the thresholds have been exceeded.

Applicant further argues that Quist does not teach determining a total system strength value; however, this limitation is met by Beakley. Beakley teaches a total fault symptom strength value (see Beakley, column 4 lines 41-49). It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify Quist to include the teachings of Beakley because determining a total fault symptom strength value would have allowed the skilled artisan to locate critical events and find patterns in the events (see Beakley, column 4 lines 46-49).

10. Applicant's arguments filed 05 January 2005, with respect to claims 23-34 have been fully considered but they are not persuasive.

Applicant argues that Schneider does not teach "outputting a fault diagnosis for at least one possible fault." However, Applicant's arguments are not well taken.

Schneider teaches detecting various events (see Schneider, column 13 lines 15-16), which include errors and failures (see Schneider, column 13 lines 36-58). Therefore, Schneider does teach outputting a fault diagnosis for at least one possible fault (see Schneider, column 13 lines 15-58).

Conclusion

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mary Kate B. Baran whose telephone number is (571) 272-2211. The examiner can normally be reached on Monday - Friday from 9:00 am to 6:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Marc S. Hoff can be reached on (571) 272-2216. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

14 March 2005

MARC S. HOFF
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800